



airTOXIC

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« Rack » design



Exp cabinet for hazardous areas

This instrument is an online instrument to analyze and monitor BTEX up to 8 compounds.

In option: Purge module to extract VOC from water

airTOXIC

Environment monitoring:

- Non urban areas
- Urban areas
- Fence line refinery
- Indoor air
- Outdoor air

Process:

- Industrial Hygiene
- Fence line

Targetted compounds:

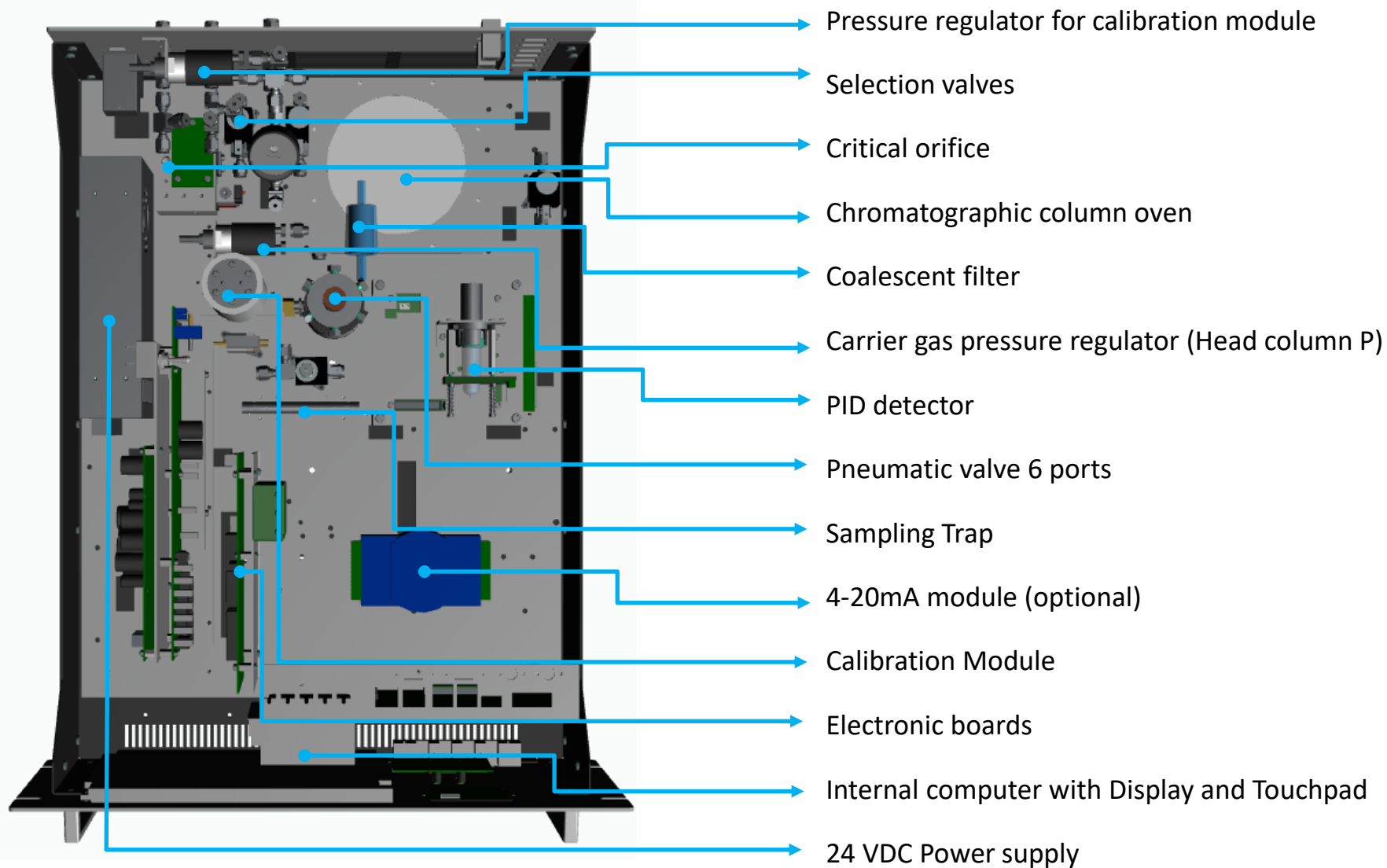
- Benzene
- Toluene
- Ethylbenzene
- Ortho-Xylene
- Meta-Xylene
- Para-Xylene
- Cyclohexane,
- Styrene
- 1,3-Butadiene (option)
- IAA (option)

Summary

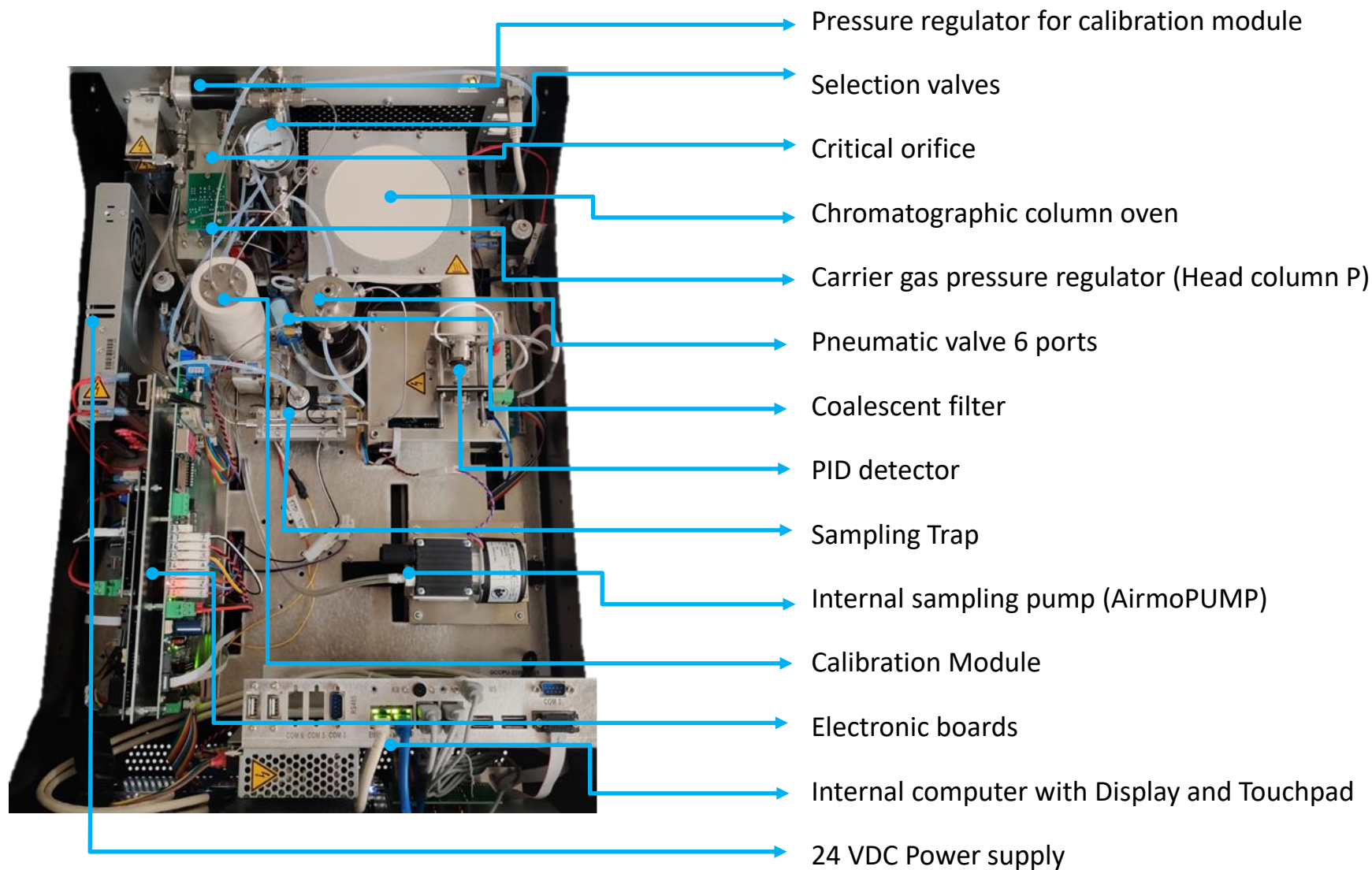


- Top view
- Principle
- Installation
- Software
- Calibration
- Service
- Preventive maintenance
- Troubleshooting
- Remote control
- Chromatotec Technical website

Top View



Top View



Principle – Sampling phase

- The gas sample is drawn by a sampling pump through a trap



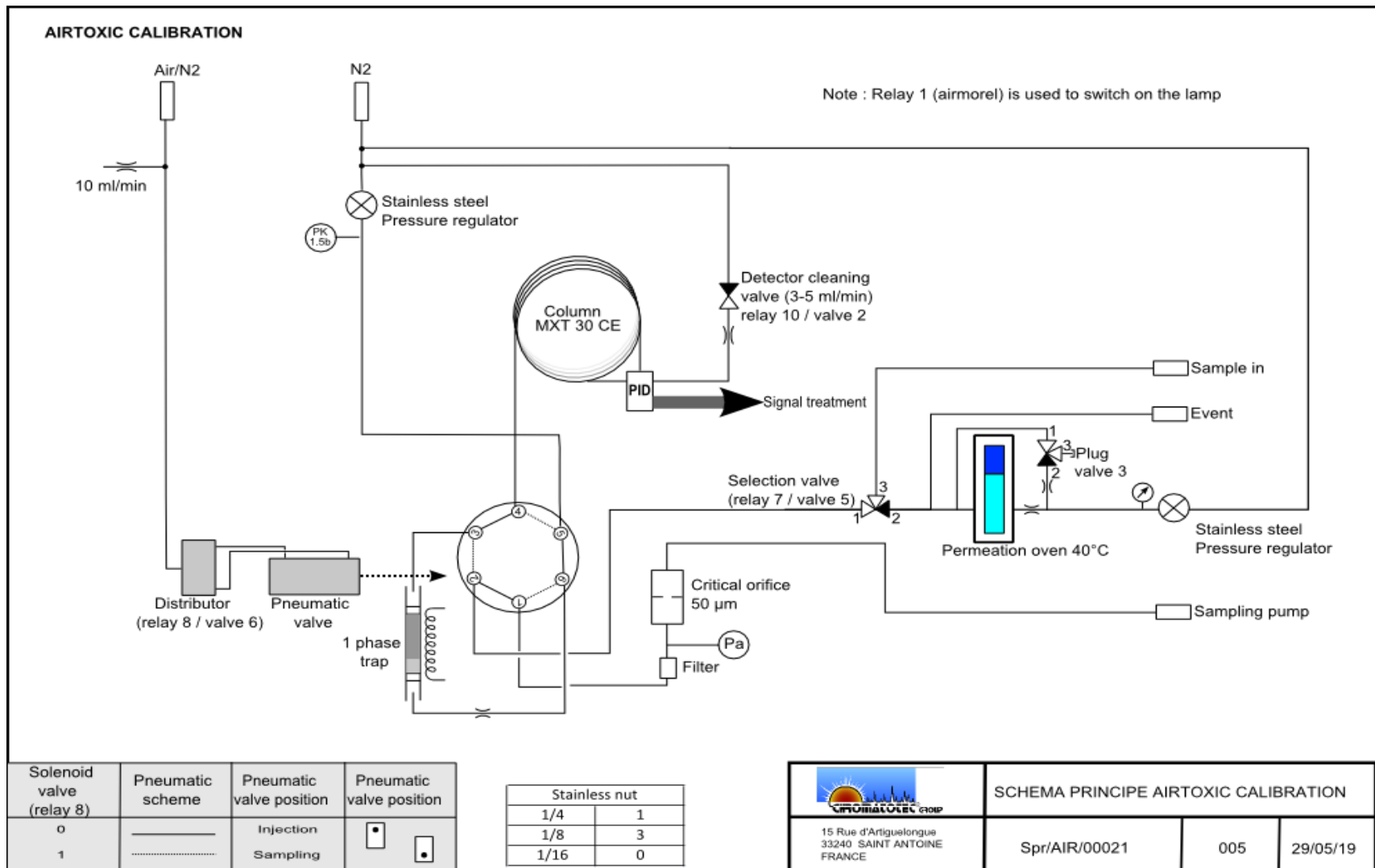
- VOCs in the sample are pre-concentrated on the adsorbent present in the trap
- The sampling flow is fixed by a critical orifice of 50 μm (flow around 16 mL/min)

Principle – Injection phase

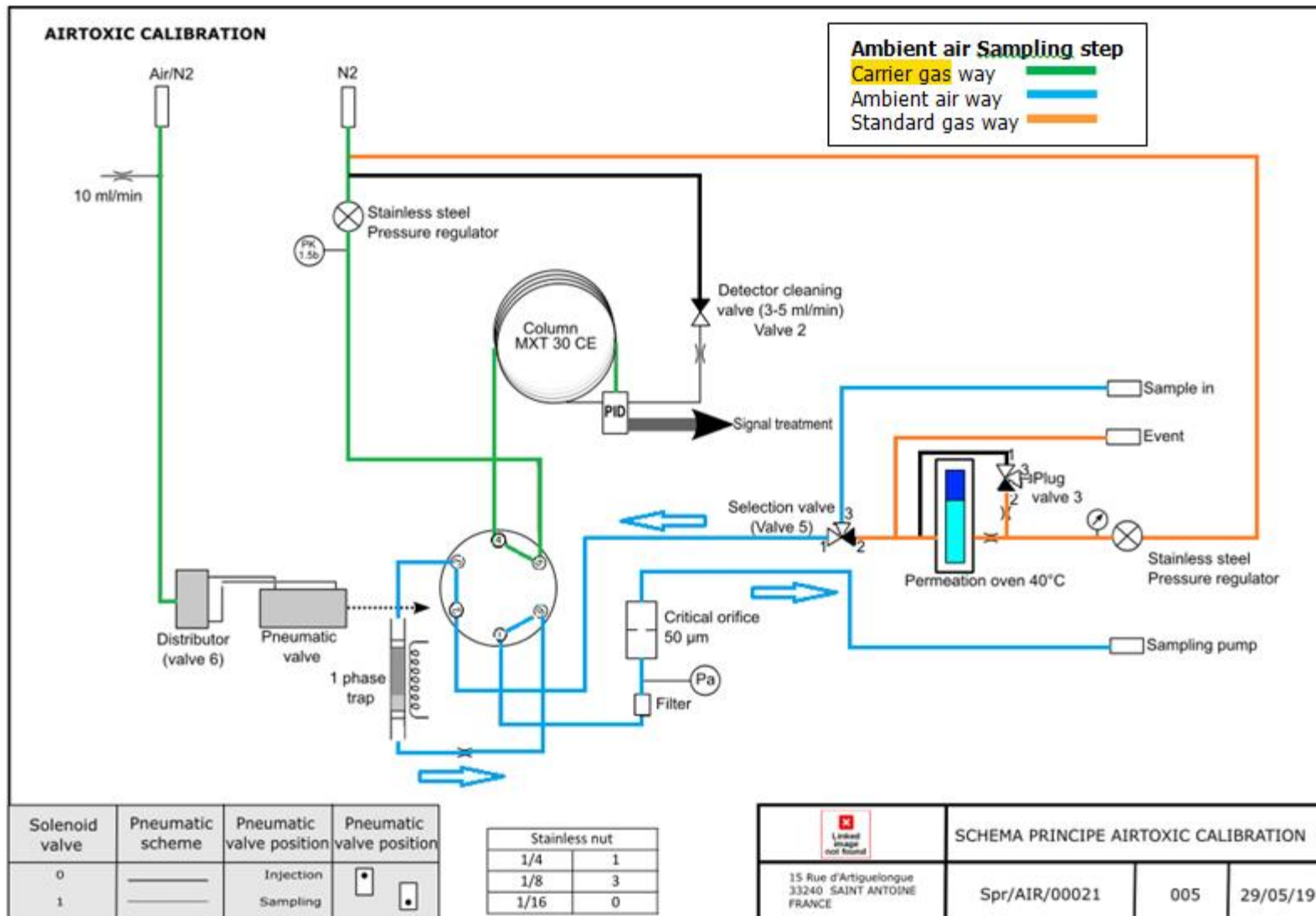
- The trap is heated to desorb the trapped VOC compounds at 380°C
- The gaseous sample is introduced in the analytical column by the carrier gas flow (N₂)
- VOCs are separated by the analytical column and detected by the PID
- **PID: PhotoIonisation Detector:**
 - High energy photons bombard the VOC (Main photons energy = 10,6 eV)
 - VOC are ionized when they absorb the UV light → Creation of cations
 - The ions produce an electrical current = detector signal
 - Non-destructive detection



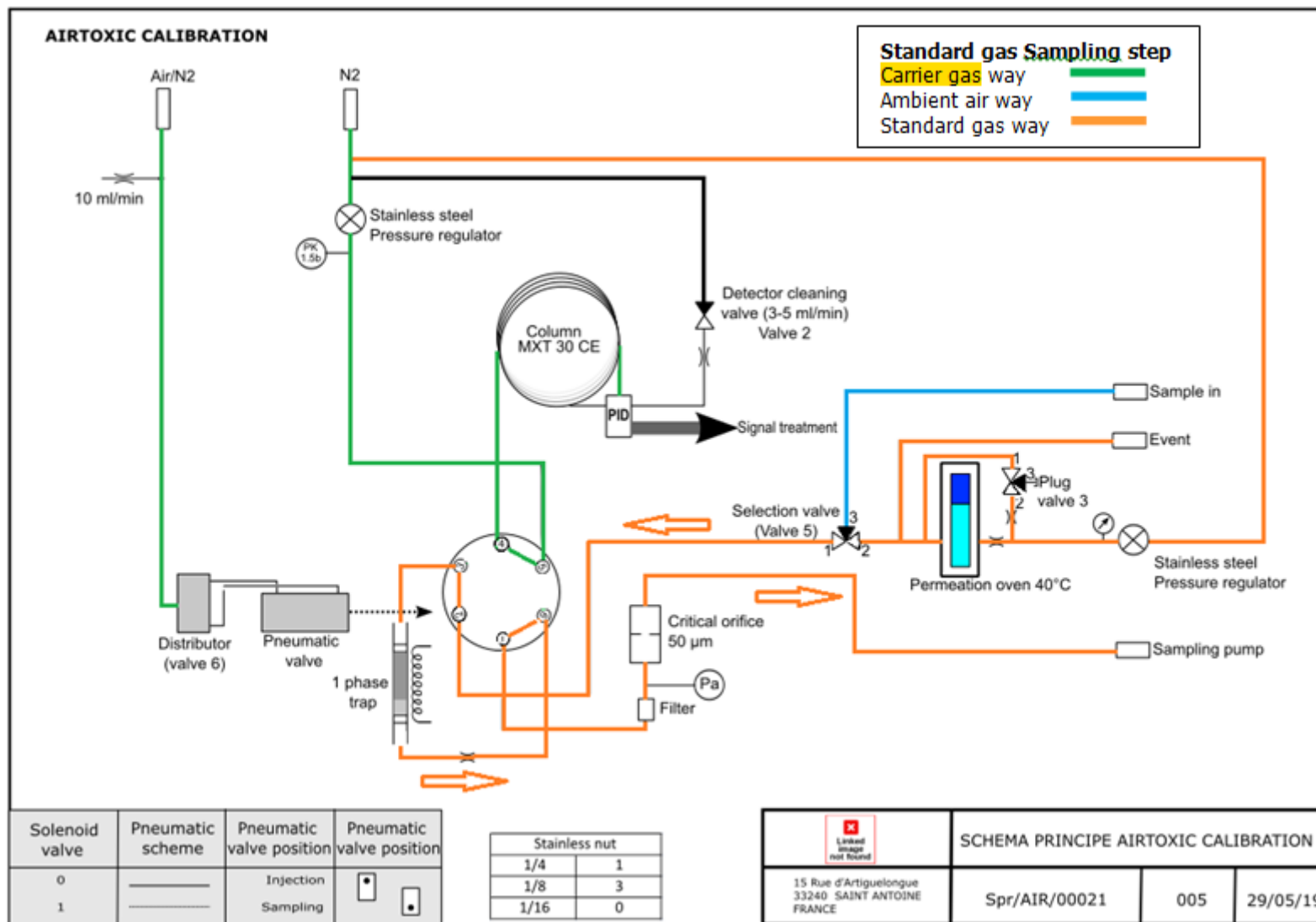
Principle – Pneumatic scheme



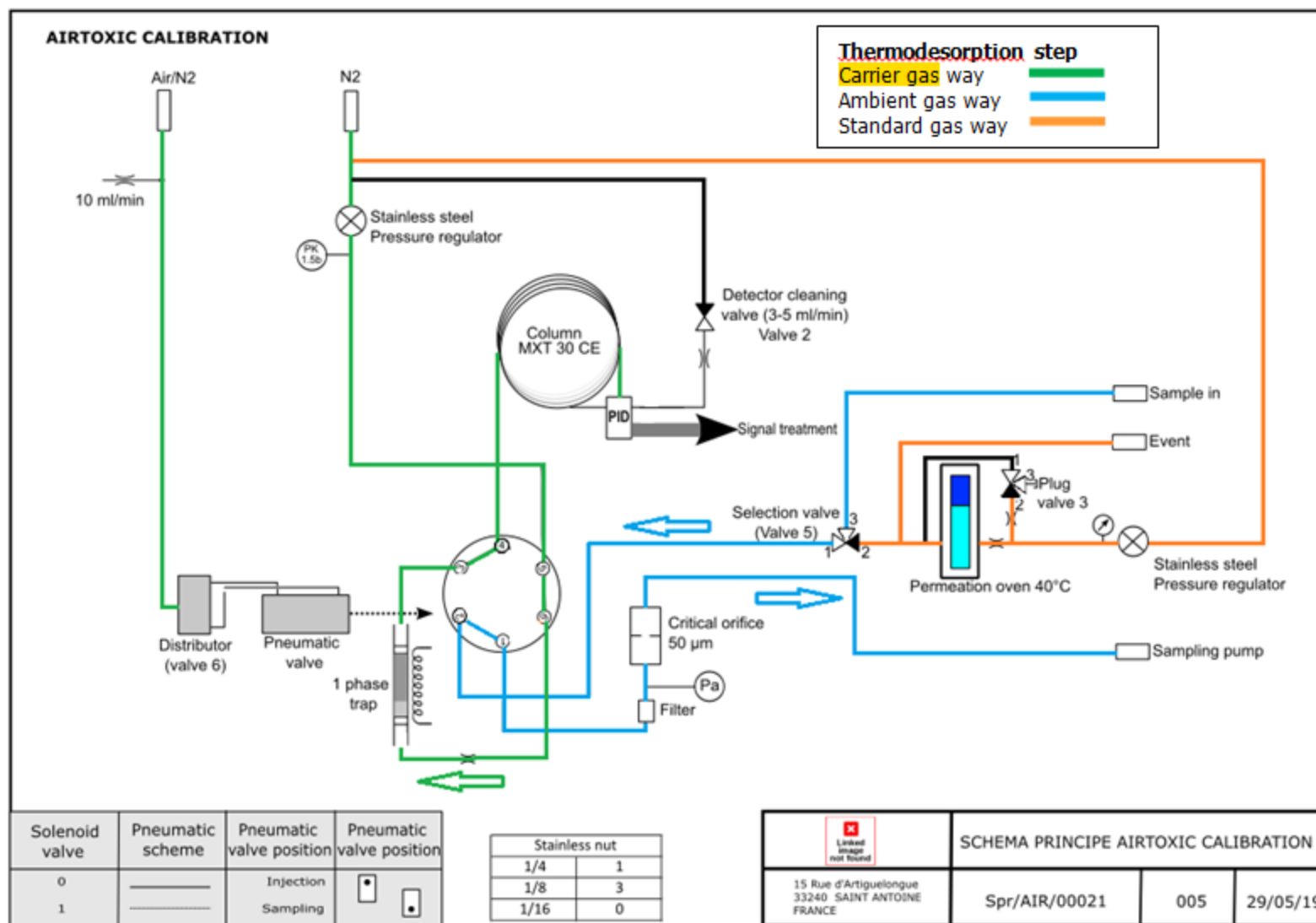
Principle – Ambient air sampling



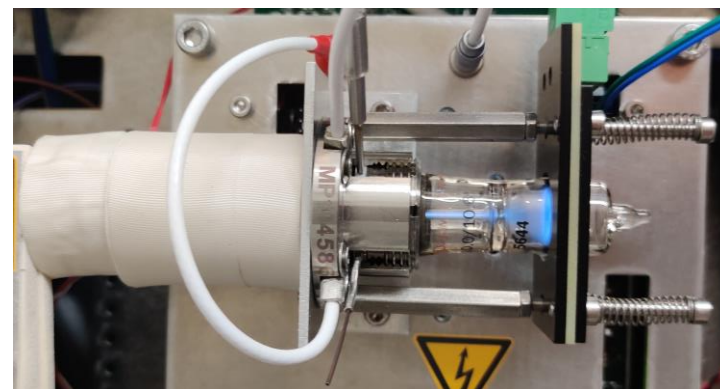
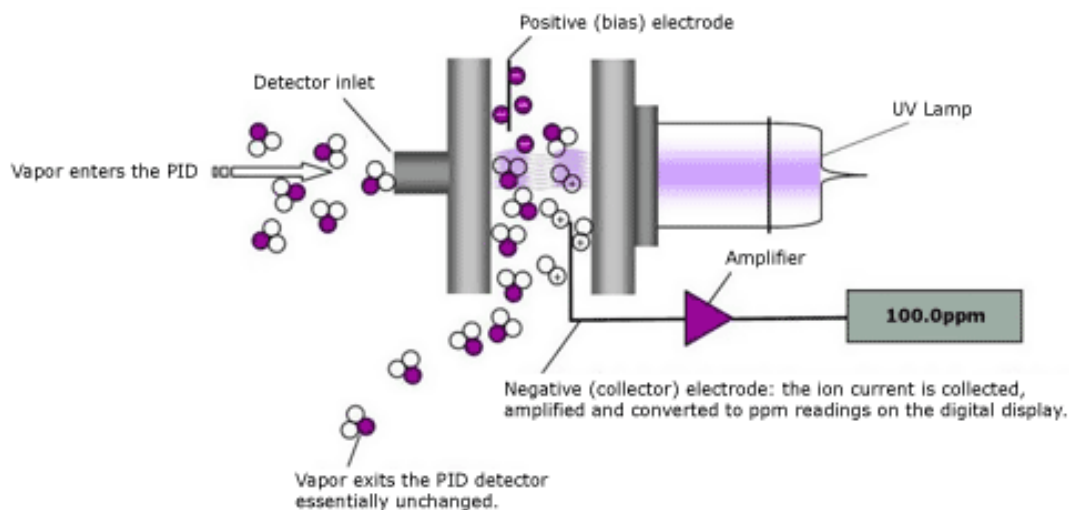
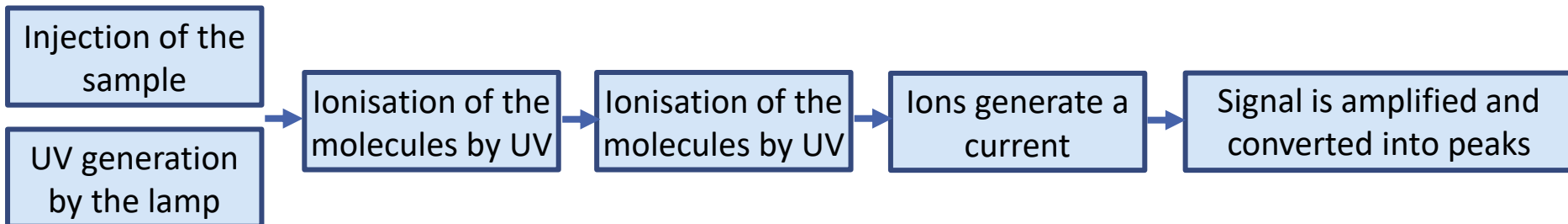
Principle – Standard gas sampling



Principle — Injection & Thermodesorption



Principle — Photolionisation Detector (PID)

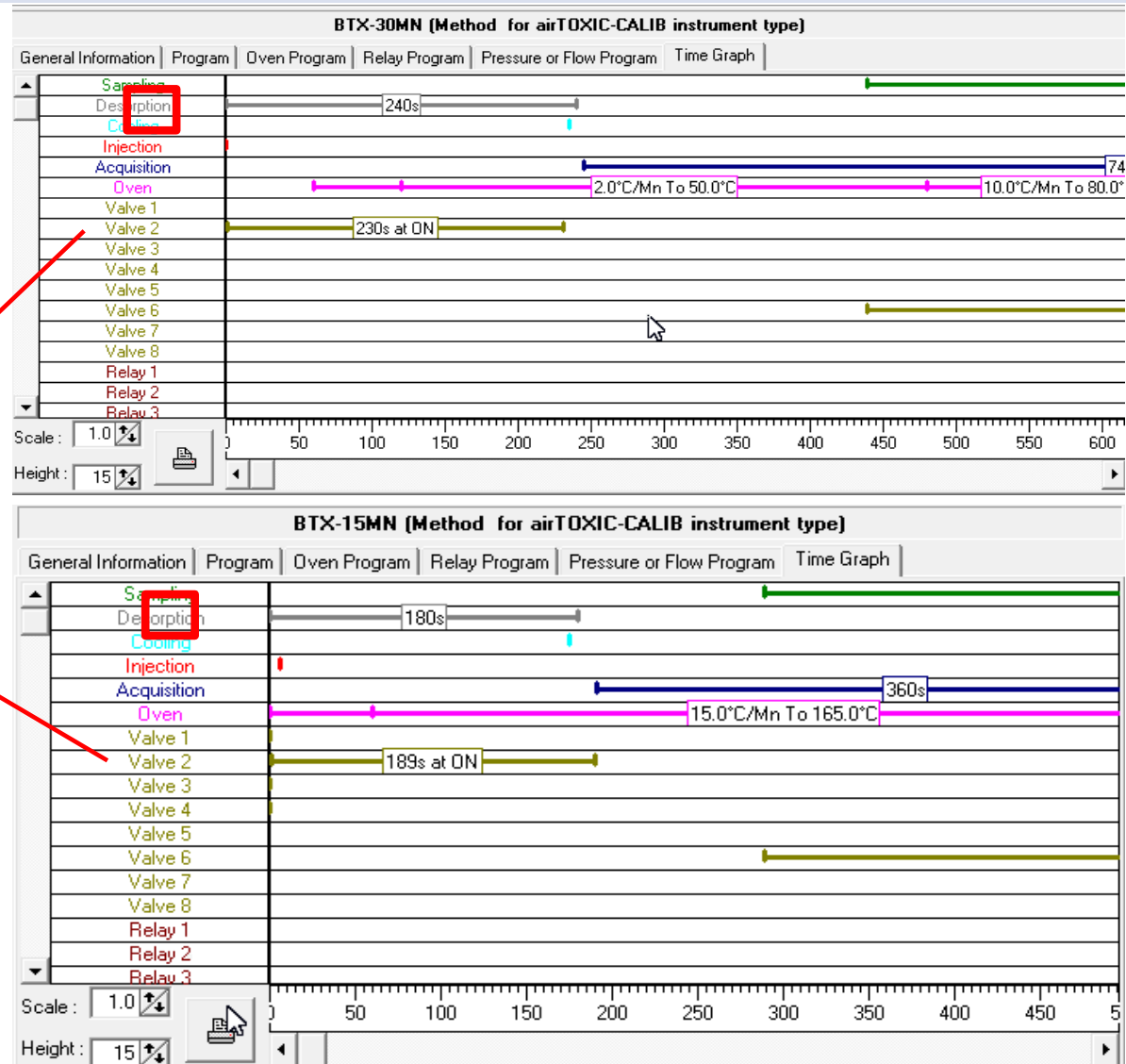


Principle – Analysis cycle

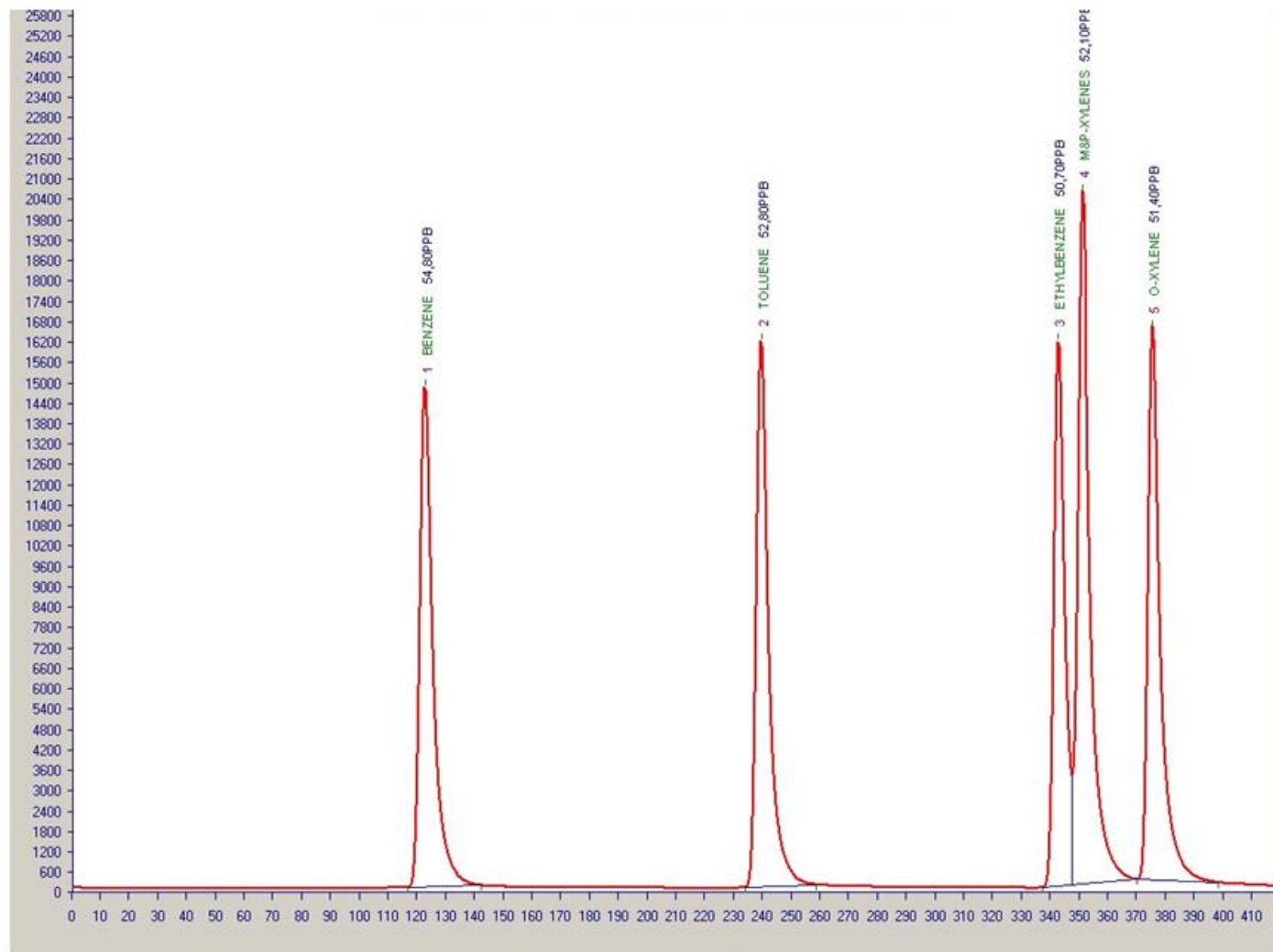
Valve 2

Controls the
solenoid valve

Activates the zero
air/N₂ for the self-
cleaning of the
PID lamp area



Principle – Chromatogram example



External calibration in a 30 min cycle

Installation

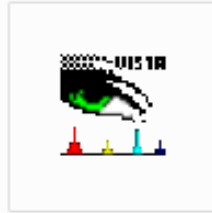
GASES Inlet pressure	He (5.5)	H ₂ (5.6)	N ₂		Ar (6.0)	Zero Air	
			Carrier gas	Clean lamp		Clean lamp	Permeation oven
Operating pressure	-----	-----	0.795 Bar	3 Bars	-----	----- Bars	-----
Flowrate (ml/min)	-----	-----	≈ 3-4	≈ 4.22	≈ 0.4 Bar	≈ ---- Bar	≈ ---- Bar
					Permeation oven 45.30 or 256.92	Permeation oven	Permeation oven

- Before unboxing the instrument
 - Read the QC report (most important document)
 - Read the easy start document
 - Purge the gas generator during one hour! (no connection the generator to the GC)
 - Purge your sampling line during 1 hour ! (no connection the line to the GC)
 - Intelligently select the location for the instrument : no vibration, smooth Air Conditionning...



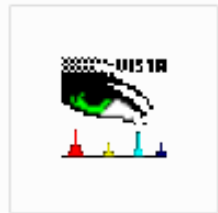
The damages created by skipping the purge of the generators will not be covered by the warranty!

Vistachrom Software



- Full analytical control
- Automatic storage of data (sample gas and calibration results)
- Visualization of the results obtained
- Full traceability for quality and audit trail purposes
- Real-time results transmitted via standard transfer protocols

Software – Log in



Vistachrom Log in

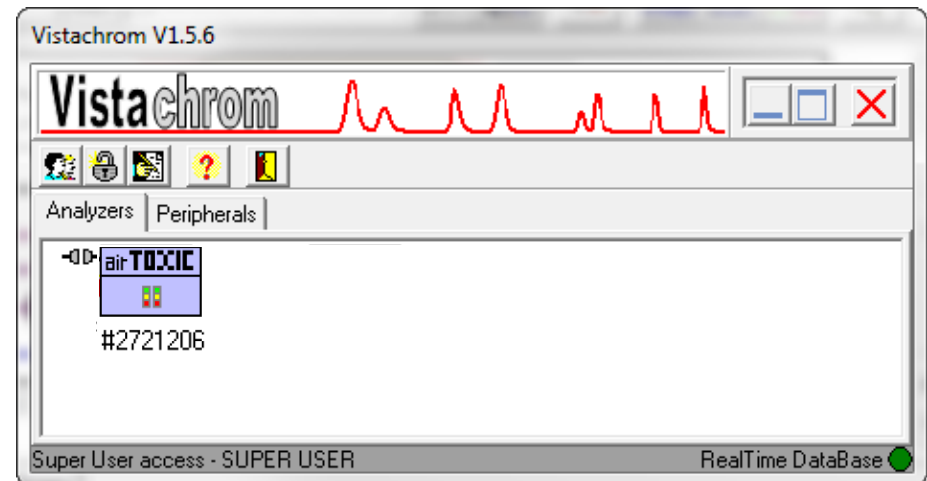
- Login : "SUPERUSER"
- Password : "1234"



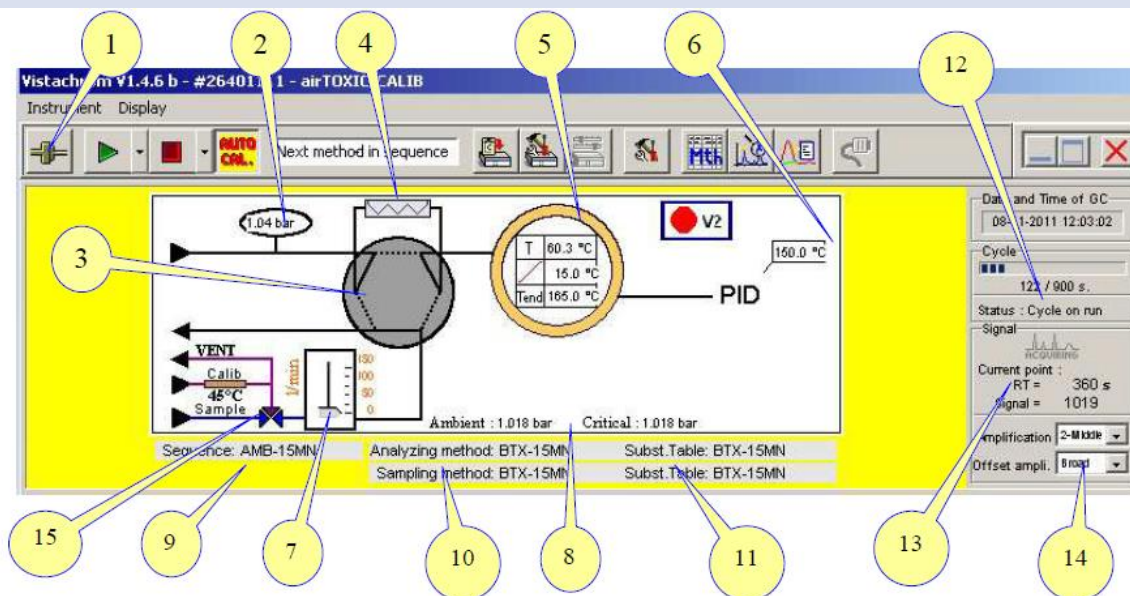
Software – “Main Window”

Main Window

- Each GC is identified by the serial number
- Double-click on the SN to open the “GC Window”



Software – “GC Window”



1: Icon to establish the communication with the PC

2: Head column PRESSURE.

3: State of the injection valve

4: trap thermodesorption state (red if active)

5: Oven temperature

6: PID detector temperature

7: Sampling flow

8: Ambient and critical pressures

9: Sequence

10: Methods (sampling / analyzing)

11: Substances table







12: Cycle and acquisition times

13: Signal value and retention times during the acquisition

14: Electrometer and Offset amplification

15: Solenoid valve for the selection of the internal system calibration

- GC and computer must be ON
- LEDs on the front panels : “stand by” and “OK” are ON

Chromatography		System	
running			OK
sampling			warning
standby			error

- Check the COM port is the one used for the communication GC-PC, usually: COM3



- Press on this icon to establish the communication GC-PC



Verifications to do, before starting the first cycles

On the software:

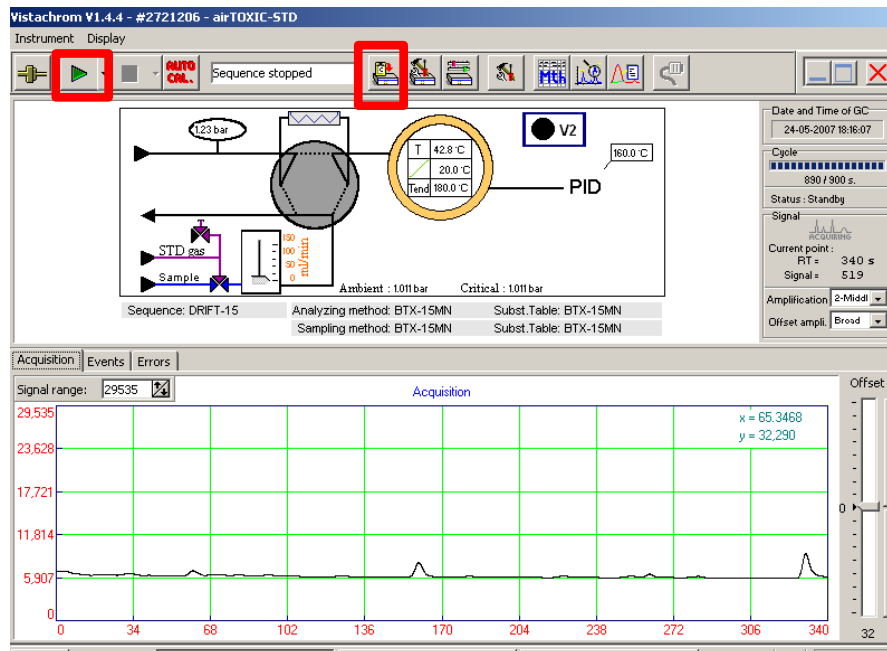
- Head column pressure
- Column temperature in stand by
- Difference between Ambient Pressure and Critical pressure (hPa)
- Temperature of PID
- Calibration temperature


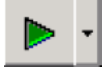
Physically on the instrument:

- Was the air generator purged one hour?
- Is the pump ON?
- Sampling flow measurement
- Check the nitrogen/air pressure on the GC : 3 bar
- Calibration flows measurements
- Install the permeation tube in the oven



Software – Analysis start



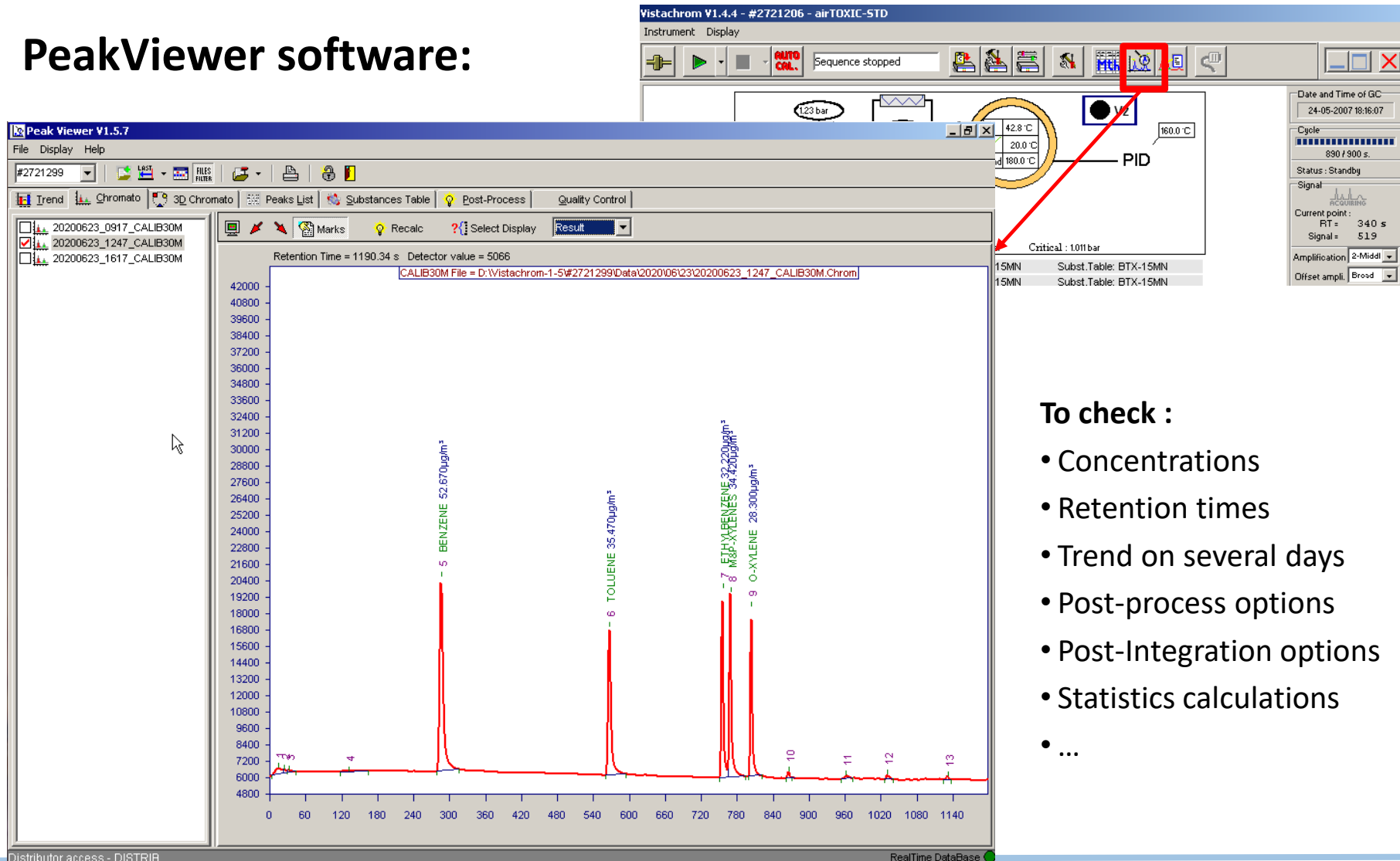
- Upload the sequence 
- Click on  to start the analysis. The first acquisition will be at the second analysis cycle. Check if during the acquisition, base-line signal is at about 3000, control with signal offset control

Data storage: 

- Data is stored as raw chromatograms and ASCII files (Excel)
- Data files are recorded and stored with date, time, and method stamp
- Data can be transmitted to data acquisition system via Modbus protocol, 4-20mA module, ...

Software – View chromatograms

PeakViewer software:



To check :

- Concentrations
- Retention times
- Trend on several days
- Post-process options
- Post-Integration options
- Statistics calculations
- ...

Calibration – “Auto-Cal”

How to use the « Auto-Cal » option?

- Write the expected calibration gas concentration in the calib substance table :

#	Name	RT Min	RT Max	Select Peak	GC Result formula
1	BENZENE-STD	48	58	Middle	Area/[0.12*[SampleVol]]
2	TOLUENE	155	165	Max	1.18*[Area/BS]
3	ETHYLBENZENE	259	269	Middle	1.45*[Area/BS]
4	MIXOXYLENES	269	279	Middle	1.11*[Area/BS]
5	OXYLENE	294	304	Max	1.4*[Area/BS]
6	BENZENE	48	58	Sum	Area/BS

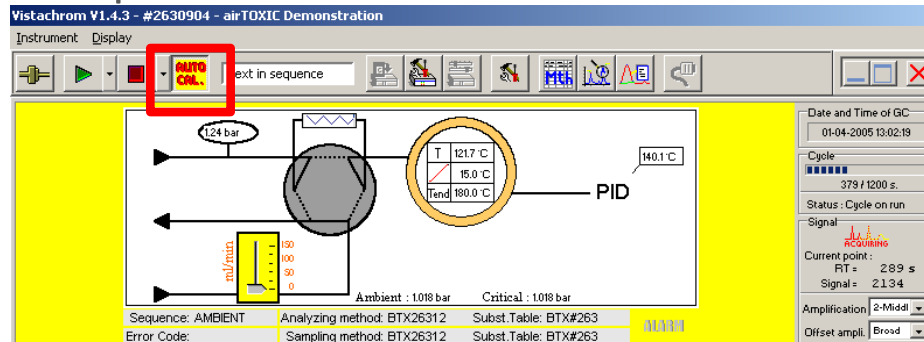
Auto-Calibration

(Area+AreaOfs)/Conc.

Name	Value
Conc.	0.12
AreaOfs	0
Average point N=	1
Min BS	3000
Max BS	50000

Concentration of the standard in mg/m³
(0.12mg/m³)

- The « Auto-Cal » option must be ON:



How the Base Sensitivity (BS) is calculated automatically?

$$BS = \frac{RF \cdot Area}{C \cdot V}$$

Parameter	Unit	Name	Remark
BS	au/ng	Base Sensitivity	BS is used to know the sensitivity of an instrument
RF	None	Response Factor	RF is a constant value, displayed in the substance table, for each chemical compound
Area	au	Area below a peak	Area displayed below each peak on a chromatogram
C	mg/m3	Concentration	
V	mL	Volume sampled through the trap	V is displayed for each chromatogram, in PeakList

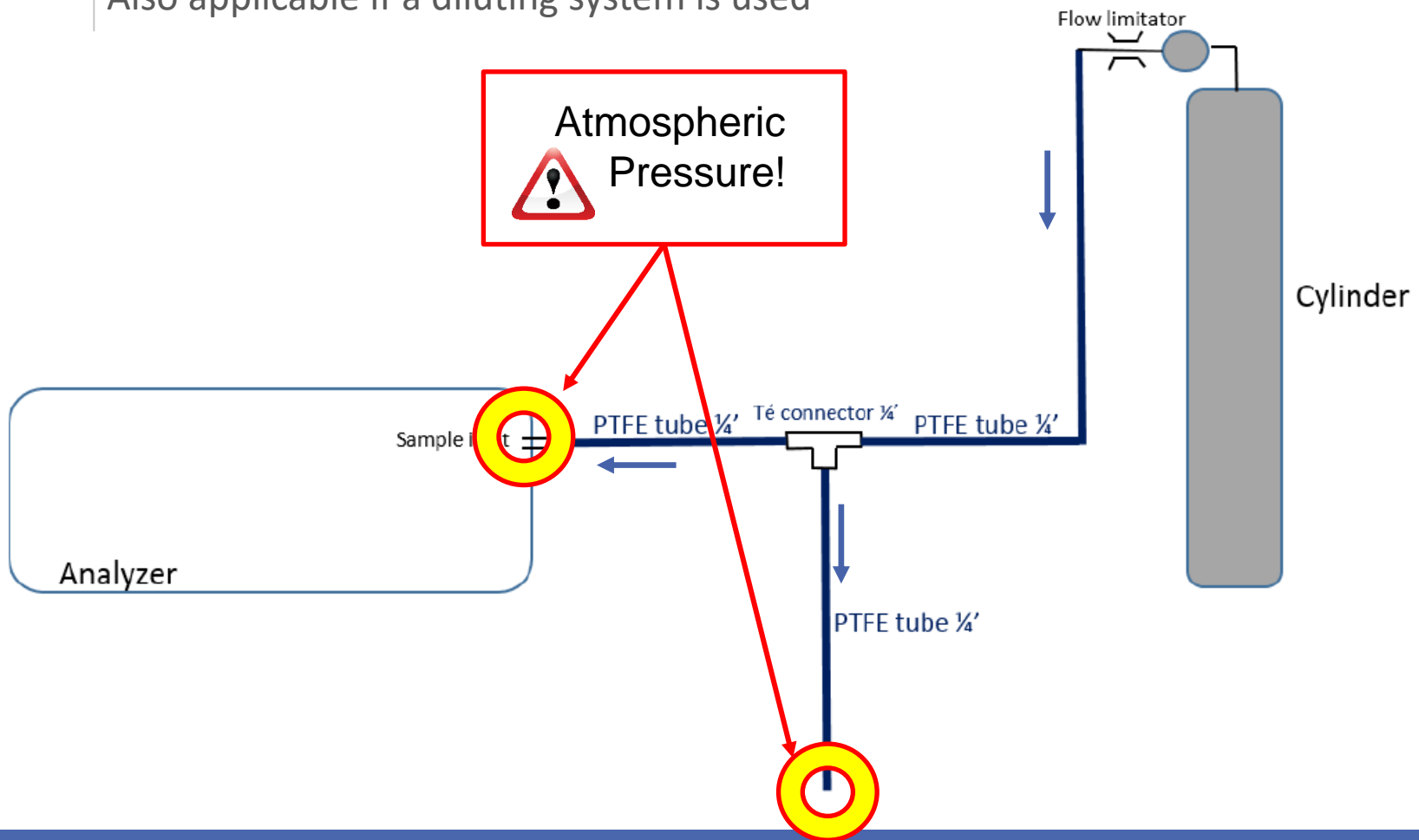
Goal of using « BS » parameter:

- Non-linear relative response formulas are used to compare a compound to the reference compound (= Benzene)
- $C \times V = a \left(\frac{Area}{BS} \right)^b$ with a and b : constants
- Follow automatically the sensitivity in time

Calibration with an external cylinder

How to connect the external calibration cylinder?

- To obtain good results
- To protect your instrument and not create damages
- Also applicable if a diluting system is used



Every week:

- Check the chromatograms (nice base line, reasonable BS drift, peaks identification, ...)

Every month:

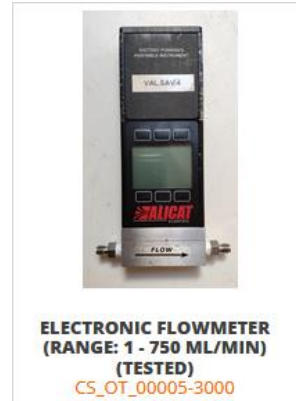
- Check the operating parameters : Pressures, flows, temperatures
- Check the PID BS, clean the PID lamp if needed
- Check the sampling flow

Every year:

- Do the preventive maintenance actions, replacing the PM parts
- Full check of the instrument : Preset, flows, pressures, sensitivity, RF adjustments...

Service – tools required

Tools you absolutely must have:



Flow regulator



Some meters of PTFE tubes

Several Swagelok fittings
(1/8 and 1/4 size)

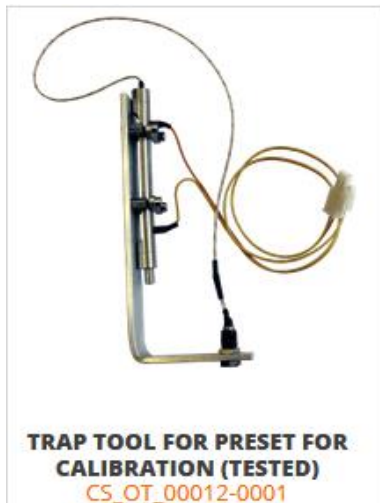
**ELECTRONIC FLOWMETER
(RANGE: 1 - 750 ML/MIN)
(TESTED)**
CS_OT_00005-3000

Flowmeter

Leak detector

Classic tool case:
spanners, screwdrivers, ...

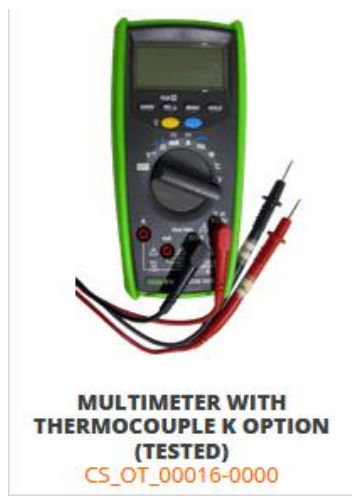
Tools advised for advanced users (distributors):



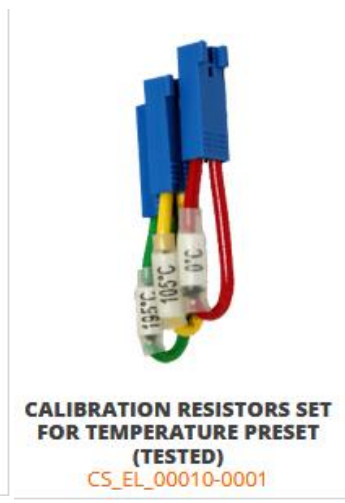
**TRAP TOOL FOR PRESET FOR
CALIBRATION (TESTED)**
CS_OT_00012-0001



**ELECTRONIC MANOMETER
ASSY (RANGE: -1 À 2 BARS
(RELATIVE PRESSURE))
(TESTED)**
CS_SE_00007-MANO



**MULTIMETER WITH
THERMOCOUPLE K OPTION
(TESTED)**
CS_OT_00016-0000



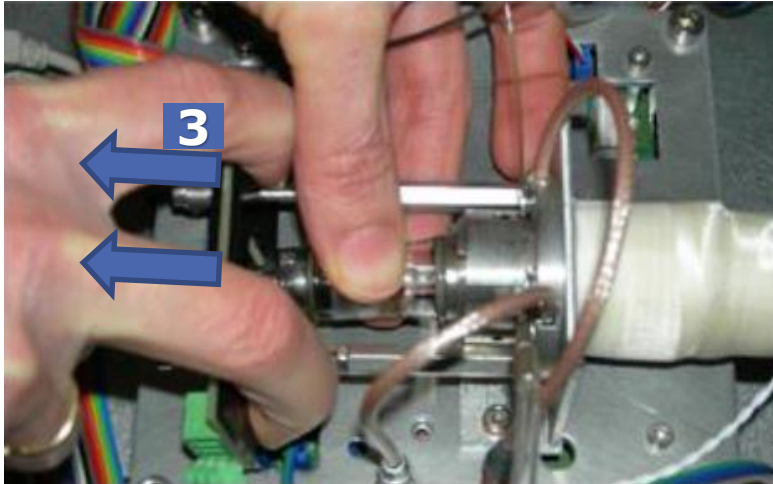
**CALIBRATION RESISTORS SET
FOR TEMPERATURE PRESET
(TESTED)**
CS_EL_00010-0001



CLEANING KIT FOR PID LAMP
CS_CH_22627-0PID

Service – clean PID lamp

→ To be done every time the PID Base Sensitivity is too low



1. Switch OFF the instrument
2. Remove the HV cable
3. Press the springs and the PID plate to release the lamp
4. Extract the PID lamp from the instrument
5. Use the special abrasive paste and deionised water, to clean the lamp
6. Rinse with water
7. Clean with acetone
8. Clean with pure Ethanol
9. Install again the lamp on the PID body
10. Reconnect the HV cable
11. Switch On the instrument



Preventive maintenance kits



airTOXIC-CALIB

For instruments with previous electronic boards until February 2020

Preventive maintenance kits

		Designation	Item number	Qty
PM Kit One year	CS_CO_TXCAL-KIT1	O-Ring 1.5 x 0.75 mm Nitril	AR_TU_09002-0000	20
		Coalescent filter	CS_FI_00208-0000	1
		Rotor 6 ports 1/8" HT	CS_PN_00005-0106	1
		O-Ring Gasket 4 x 1	AR_TU_09007-0000	2
		O-Ring Gasket 6 x 1	AR_TU_09104-0000	1
		Membran and valves Kit for external and internal airmoPUMP	EP_SA_00004-0001	1
PM Kit Two year	CS_CO_TXCAL-KIT2	Permeation tube Benzene - around 15 ng/min at 40°C (airmotec certified at ± 10%)	CS_CH_01100-2014	1
		O-ring OR 22.5 x 1.5	CS_TU_09000-0000	1
		PID Lamp - 10.6 eV.	CS_DE_00009-106V	1
PM Kit Three year	CS_CO_TXCAL-KIT3	Pneumatic actuator 6 port	CS_PN_00005-0002	1
		Trap for airmoVOC C6-C12 or BTEX	AR_SA_05157-0000	1
		Distributor 24V	CS_PN_00004-0024	1
		Hard disk 128Go SSD 2,5 (SATA connection) since 03/2012	IT_CP_00340-0128	1
PM Kit Five year	CS_CO_TXCAL-KIT5	CPU Board, tested, Incl. Memory supply and H8	CS_CT_01000-CPUT	1
		Column Oven Fan 24V DC 119*119 mm	CS_SE_05015-0001	1
		3-way solenoid valve stainless steel (1/8")	CS_PN_06331-0341	1

For more details, please check our website (pictures, references, prices, spare parts kits...)

<https://support.chromatotec.com/>

Troubleshooting – 1/3



Symptom	Probable cause	Corrective action
No detection, Flat base line	Sample flow is not correct	Switch on the sampling pump Measure the sampling flow with a flowmeter
	The lamp never turns ON	Check that the PID lamp is properly installed Check the HV cable is connected on the PID plate Check the lamp is not too old (> 2 years)
	The trap is never heated	Check if trap is hot with your finger when thermodesorption is activated Check the trap resistance (should be around 4,1 Ohms) Check that the trap is connected to the power board
	Injection valve does not actuate	Check the Air and N ₂ pressure applied to the GC : 3 bar mini In std by, check the ΔP (should be around 20hPa) Be sure the preventive maintenance was done on the valve (rotor, actuator...)
No peak during calibration	PID lamp is dirty	Clean the lamp, following Chromatotec procedure
	No detection, flat baseline	See section « No detection, Flat base line »
	Internal calibration gas is not sampled	Check the selection valve (3 ways electrovalve) is working well
	External calibration gas is not sampled properly	Check that your calibration cylinder is connected properly to the GC, using a « te » and a vent

Troubleshooting – 2/3



Symptom	Probable cause	Corrective action
Peaks not identified automatically	Wrong head column pressure	Adjust the Head column Pressure to match with the QC report
	Column temperature problem	Check the temperature in the lab: it must be stable: $20^{\circ}\text{C} < T < 25^{\circ}\text{C}$ Adjust the RT ranges in the substance tables Check the RT are stable from a cycle to another
Retention times fluctuating too much from a cycle to another	Head column pressure not stable	Check the Air and N2 pressure applied on the GC : must be stable at 3 bar
	Column temperature problem	Check the temperature in the lab: it must be stable: $20^{\circ}\text{C} < T < 25^{\circ}\text{C}$ Check Air Conditionning is not blowing directly on the GC Check the column T in std by mode Check « -1°C » is never displayed as the column T
Concentrations values incorrect	« Auto-Cal » option is not actived	Activate « Auto-Cal » option Be sure one calibration is done every day (at least!) Check the BS is in the acceptable BS range (see calib substance table)
	Wrong flow on the internal calibration oven	Using an external flowmeter, measure and adjust if need the flows crossing the calibration module. Don't forget to swith OFF the sampling pump during this flow measurment.
	Wrong temperature of the internal calibration oven	Check the oven calibration oven temperature to be in conformity with the QC report
	External calibration gas is not sampled properly	Check that your calibration cylinder is connected properly to the GC, using a « te » and a vent. Check the sample and the calibration gas are provided at AMBIENT PRESSURE!

Troubleshooting – 3/3

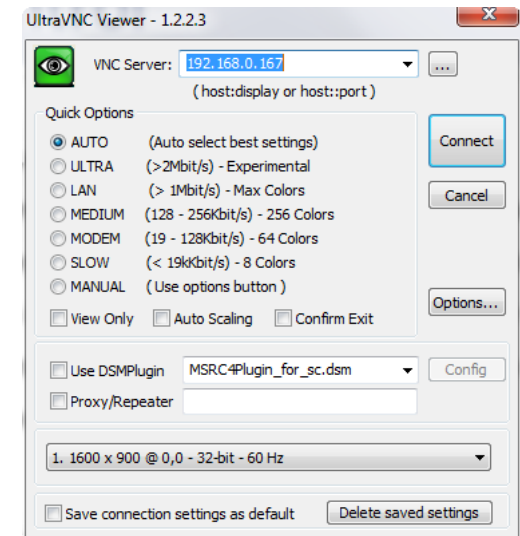


Symptom	Probable cause	Corrective action
Unwanted peaks are visible	Pollution of the carrier gas / Pollution of the column / Trap polluted	Check the purity of the carrier gas used (purge your gas) Start a « CLEAN » sequence during one night, to remove the pollutions
	Pollution in the injection valve	Clean the rotor with deionised water, in the ultrasons bath Replace the rotor Clean the head of the injection valve
The base line is noisy	Detector malfunctionning	Check the PID electrodes are well connected Check there is no electrical contact between the two electrodes Check there is no electrical contact between the electrodes and the column
	Detector is vibrating	Check there is no vibration on the GC
Other strange phenomenons	Hardware/software bug	Start a Hard reset and a Soft Reset, following Chromatotec procedures

Remote control

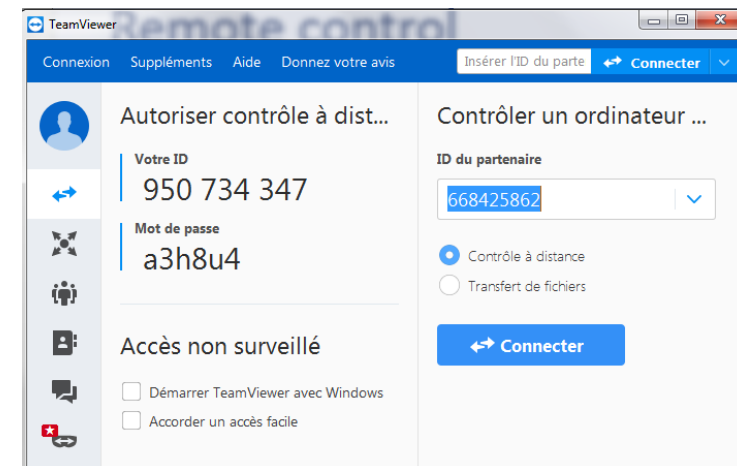
UltraVNC:

- Easy to use for local area connections
- On the Chromatotec computer, the software is automatically started at Windows start up
- On the remote computer, just write the IP address of the Chromatotec computer



TeamViewer:

- Easy to use for connections through internet
- On the Chromatotec computer, start the software from: D/TeamViewer
- On the Chromatotec computer, write down the IP and password written in TeamViewer
- On the remote computer, just write these ID and password



AirToxic can be tuned!



Pneumatic options:

- Special calibration module to check the linearity, diluting the standard gas at different ratios
- Special calibration module do dilute the calibration gas with a Mass Flow Controller
- Special inlet dedicated to an external calibration cylinder
- Use several VOC permeation tubes in the same oven
- Possibility to sample different sample streams (multiplexing system)

Calculation options:

- Use of a non-linear Benzene response formula, to pass more easily the NF_EN_14662-3 2015 linearity test for very low concentrations

AirToxic : actual configuration:

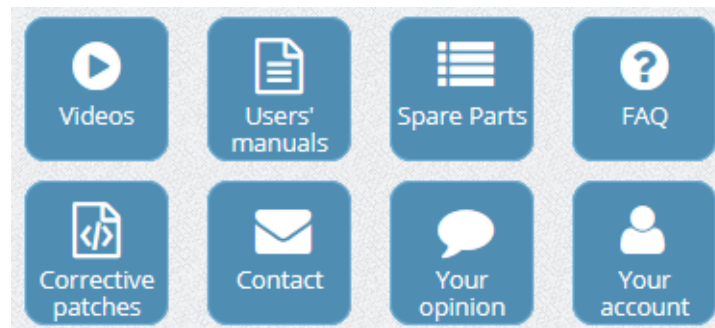
Don't be surprised when receiving your AirToxic ordered recently! Here is the actual configuration:

- Sampling pump: embedded, 24VDC, located inside the rack
- New electronic boards set: with more options : lamp current displayed on Vistachrom...

Visit our technical website

We highly recommend you to have a look to our technical website.

<https://support.chromatotec.com/>



It is really helpful to:

- ✓ Start
- ✓ Understand the GC functioning
- ✓ Calibrate
- ✓ Maintain
- ✓ Solve a problem

Thanks!

Thanks for choosing the airTOXIC!



→ Future training sessions :

- New Vistachrom options
- BTX analyzers
- DetNH3
- New electronic boards
- ...